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NATURAL AND SYNTHETIC SWEETENERS

VOLUME 6

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J. NEWTON,
ASSISTANT EDITOR

1

[The effects of trace iron on amino-carbonyl reaction. II. Browning degradation of fructose-amine.]
Umemoto, S.-I.; Ishiie, S.; Irie, Y.; Imai, T.
Journal of the Agricultural Chemical Society of Japan [Nihon Nogei Kagakkai-shi] **44** (2) 71-76 (1970) [10 ref. Ja, en]

The effects of trace iron on the amino-carbonyl reaction were investigated using 1-deoxy-1-β-alanino-D-fructose (DAF) as starting material. Browning degradation of DAF was intensively accelerated by trace iron resulting in remarkable increase of glucosone, and the browning reaction proceeded almost linearly from the beginning. Measurable increases of unknown carbonyl compounds, one of which seemed to be glyoxal, were also observed. The remarkable effect of iron in DAF degradation was not observed in the reaction of 3-deoxyglucosone, glucosone and 5-hydroxymethyl-2-furfural with β-alanine. These results suggest that oxidative catalysis of iron is most effective in the degradation of fructose-amine into glucosone. AS

2

[Structure and taste of sweet and bitter compounds.]
Struktur und Geschmack süsser und bitterer Verbindungen.
Belitz, H.-D.
Zeitschrift für Ernährungswissenschaft **12** (3) 190-200 (1973) [20 ref. De] [Inst. für Lebensmittelchemie, Tech. Univ., Munich, Federal Republic of Germany]

3

Determination of cyclamate in soft drinks by reaction with nitrous acid. II. Manual and semi-automated methods: determination of cyclohexyl nitrite by diazotisation and coupling with Bratton-Marshall reagent.
Shenton, A. J.; Johnson, R. M.
Analyst **98** (1171) 745-748 (1973) [12 ref. En] [Lyons Central Lab., London, W14 0QU, UK]

The determination of cyclamate at a concn. of approx. 1 mg/ml in soft drinks [orange and lemon] is described. Cyclohexyl nitrite, derived from cyclamate by reaction of the latter with nitrous acid, is determined in a non-aqueous system by initial diazotisation with sulphanilamide and subsequent coupling with 2-aminoethyl-1-naphthylamine. Manual and semi-automated procedures have been evaluated and interference has been studied. [See FSTA (1973) 5 5H740 for part I.] AS

4

Determination of cyclamate in soft drinks by reaction with nitrous acid. III. Manual and semi-automated methods: determination of excess of nitrous acid with safranine.
Shenton, A. J.; Johnson, R. M.
Analyst **98** (1171) 749-754 (1973) [6 ref. En]

The determination of cyclamate in soft drinks [orange and lemon] at a concn. of approx. 1 mg/ml is described. Excess of nitrous acid is added to the sample and unconsumed nitrous acid is determined colorimetrically with safranine. Factors that affect the sensitivity of the latter reaction, and interference due to other components of soft drinks have been investigated. Preliminary precipitation with zinc hexacyanoferrate(II) effectively reduces this interference. [See preceding abstr. for part II.] AS

5

Potentiometric titration of chloride in corn syrup using the chloride ion electrode.
Jacin, H.
Stärke **25** (8) 271-272 (1973) [5 ref. En, de, fr] [Res. and Development Div., Life-Savers Inc., N. Main St., Port Chester, New York 10573, USA]

A potentiometric method for determination of Cl^- in corn syrup was developed. Cl^- is titrated with $AgNO_3$ and the end point determined by the chloride solid state membrane electrode. The method is suitable for normal and deionized corn syrups. Most common anions and oxidizing agents do not interfere, but sulphide ions must be absent and cyanide and iodide present in traces only. Cl^- ion level must be $\geq 300 \times$ the bromide, $100 \times$ the thiosulphate and $8 \times$ the NH_3 level. Analysis of a corn syrup gave 1.09-1.10 mg Cl^-/g dry solids, SD 0.0056, relative SD 0.511% for 6 determinations. Recovery of added Cl^- was 97.1-100.8% on 3.77 mg. Analysis of 6 syrups gave 0.03 (deionized syrup) to 1.31 mg Cl^-/g solids. RM

6

Chemical and physiological properties of glucose syrup components. [Lecture]
Birch, G. G.; Etheridge, I. J.
Stärke **25** (7) 235-238 (1973) [14 ref. En, de, fr] [Nat. Coll. of Food Tech., Weybridge, Surrey, UK]

7

Determination of silica in corn syrup.
Jacin, H.
Stärke **25** (9) 309-311 (1973) [7 ref. En, de, fr] [Res. & Development Div., Life-Savers Inc., North Main St., Port Chester, New York 10573, USA]

A method for determination of Si in corn syrup is described using formation of a silicomolybdate complex ($SiO_2.12MoO_3$) which upon reduction with 1-amino-2-naphthol-4-sulphonic acid gives a heteropoly blue which absorbs at 810 nm. Interfering phosphomolybdate is neutralized by addition of oxalic acid. The method is accurate for 0.1-1.0 mg Si/ml. Repeated analysis of a corn syrup gave 17.8 µg Si/g solids with SD 0.06, relative SD 0.34% for 9 determinations. Recovery of added Si was 99-103%. Analysis of 5 corn syrups showed 12-22 µg Si/g solids. RM

8

[Rapid determination of sodium N-cyclohexyl-sulphamate.]
Matsunaga, K.
Japan Analyst [Bunseki Kagaku] **20** (5) 606-610 (1971) [14 ref. Ja, en] [Hygienic Lab. of Okayama, Furugyo-cho, Okayama-shi]

A simple and rapid method is presented for colorimetric determination of sodium cyclohexyl-sulphamate (sodium cyclamate) in food products. Sodium cyclamate was found to give cyclohexyl-amine by reaction with dimethylsulphoxide in an H_2SO_4-acidic medium and the reaction was applied to its determination as follows. 3 ml of dimethylsulphoxide and 0.5 ml of 0.5N H_2SO_4 were added to the test solution, and the mixture was heated in boiling water for 60 min. After being cooled, it was neutralized with NaOH. It was then brought to pH 12.0 with a buffer solution and shaken with chloroform. The extract was washed with Kolthoff's buffer solution (12.0), and ethanol and quinhydrone were added. The mixture was warmed, and its absorbance was read at 495 nm. The SD of the result was 15.5 ppm and the coeff. of variation was 2.5%. AS

9

The metabolism of saccharin in laboratory animals.
Byard, J. L.; Golberg, L.
Food and Cosmetics Toxicology **11** (3) 391-402 (1973) [9 ref. En, fr, de] [Inst. of Expt. Pathol. & Toxicology, Med. Coll. of Union Univ., Albany, New York 12208, USA]

Rats and monkeys were given a single oral dose of 40 mg sodium [^{14}C]saccharin/kg in an attempt to detect and measure metabolites of saccharin. ≤90% of the [^{14}C]saccharin was recovered in the urine collected for 96 h after dosing. During the first 4-8.75 h collection period, no more than 0.3% of an oral dose of saccharin was excreted in rat bile, while up to 11.7% passed into the bladder. Daily oral doses of 20, 100 and 500 mg sodium saccharin/kg given to monkeys for over 2 yr, had no effect on the metabolism of a single oral dose of [^{14}C]saccharin. It was concluded that in the species studied and within the limits of the analytical methods, saccharin was not metabolized. VJG

10

Low caloric sweeteners.
Cella, J. A.; Schmitt, W. H. (Alberto-Culver Co.)
United States Patent 3 753 739 (1973) [En]

A slurry of an aspartyl-phenylalanine methyl ester sweetener is mixed with a heated aqueous starch hydrolysate having a dextrose equivalent (DE) of 0-20, and then spray-dried to provide an expanded pulverulent low calorie sweetener. IFT

11

[Heat preservation of Dioscoreophyllum cumminsii.]
Kvale, O.
Norsk Veterinaertidsskrift **85** (7/8) 377-379 (1973) [6 ref. No] [Norsk Inst. for Naeringsmiddelforskning, Norway]

D. cumminsii (Serendipity berries) were covered with water in open glass jars and heated in a water batch for 10 min at 60°, 70°, 80°, 90° or 100°C or for 15 or 30 min at 100°C. The contents of each jar were then divided into 2 parts for storage; in 1 part the water was drained and in the other it was left with the fruit. Additionally, Sorensen's citrate buffer (pH 3.5) was used in 3 tests involving heating for 10 min at 60°, 80° or 100°C. The result of organoleptic evaluation of the treated fruit, covering taste, colour and consistency, are tabulated. It is concluded that Serendipity berries are not suitable for heat treatment as moderate heat leads a distinct change in colour and pasteurization completely destroys their sweetening effect. HBr

12

Nutritive sweeteners.
United States of America, Food & Drug Administration
Federal Register **38** (179, Sept. 17) 25985-25987 (1973) [En] [Washington, DC]

The following definitions and standards of identity under the Federal Food, Drug and Cosmetic Act are adopted (after consideration of FAO/WHO Codex Standards). Dextrose monohydrate is crystallized D-glucose. H_2O meeting the following specifications (by AOAC methods): 90% TS, 99.5% (dry basis) reducing sugars expressed as D-glucose, 0.25% sulphated ash, and 20 mg SO_2/kg. Dextrose, anhydrous, is D-glucose without H_2O of crystallization containing 98.0% TS. Glucose syrup is the conc. aqueous solution of nutritive saccharides obtained by the incomplete hydrolysis of any edible starch meeting the following specifications: ≥70% TS and 20% reducing sugars (expressed as D-glucose), 1.0% sulphated ash, and 40 mg SO_2/kg. Dried glucose syrup is glucose syrup from which the H_2O has been partially removed, with TS ≥90%, reducing sugars ≥88% (as D-glucose, dry basis), or TS ≥93% if reducing sugars are <88%. CAS

13

[Increasing sweetness of sugar.]
Eisai Co. Ltd.
Japanese Patent 4827472 (1973) [Ja]

An ion-exchange isomerization process for converting glucose to an invert sugar having a glucose:fructose ratio of 65:35 is described. IFT

14

Carbohydrate Chemistry - VI. Plenary lectures presented at the VIth International Symposium on Carbohydrate Chemistry held at Madison, USA, 14-18 August 1972. [Book]
International Union of Pure & Applied Chemistry 131-208pp. ISBN 0 408 70525 6 (1973) [many ref. En] London, UK, Butterworths

The history of the marketing of carbohydrates, including cane sugar, glucose, and other specialist sugars is reviewed. JN

15

[Possibility of reducing sucrose content of some confectionery products and of its partial replacement by liquid glucose.]
Sretonov, F.
Khranitelna Promishlenost 22 (7) 26-27 (1973) [4 ref. Bg] [Nauchno-issled. Inst. po Zakharoprerabotvane, Nisheste i Glikoza, Bulgaria]

The present tendency is to reduce the 2:1 proportion of sucrose to liquid glucose (LG) in caramel confectionery to 1:1 or even 1:2. LG of low content of reducing substances and low inversion power is required for such procedure. It was found that addition of sodium acetate to LG at 1 kg/t gave a product leading to 17.6% reducing substances in the caramel mass vs. 62.7% for untreated LC, and with 72% of the original inversion power. It is considered that introduction of treated LG in manufacture of caramel and other sweets to give a 1:1 ratio to sucrose would save the Bulgarian industry 1000 t sucrose and cheapen production by approx. L 100 000; and that the resulting reduction in sweetness would be fully acceptable to the consumer. SKK

16

[Report of the 24th Starch Conference in Detmold.]
Bericht über die 24. Stärke-Tagung 1973 in Detmold.
Germany, Federal Republic of,
Arbeitsgemeinschaft Getreideforschung eV
Stärke 25 (9) 311-313 (1973) [De]

[Continued from preceding abstr.] A new heat-stable bacterial amylase for liquefying starch at high temp., by G. Madsen; New possibilities for using glucose isomerase in the starch and food industries, by H. U. Geyer; Chemical structure and physiological effects of glucose syrup components, by G. G. Birch; Industrial experience with direct saccharification of maize grits, by C. Bos; and Theoretical and practical problems of producing sugar for infant nutrition, by J. Hollo. RM

17

The excretion and metabolism of saccharin in man. I. Methods of investigation and preliminary results.
McChesney, E. W.; Golberg, L.
Food and Cosmetics Toxicology 11 (3) 403-414 (1973) [15 ref. En, fr, de] [Inst. of Expt. Pathol. & Toxicology, Med. Coll., Albany, New York 12208, USA]

Methods for the determination of saccharin and its most probable breakdown product (o-sulphamoylbenzoic acid; o-SAMB) in urine have been developed and appled to a study of the metabolism of saccharin in man. When administered in 1 g. doses to 3 subjects, saccharin appeared to be excreted quantitatively in the urine in unchanged form by 2 of the subjects within 48 h. However, in a subsequent and more detailed experiment in 6 subjects, involving the administration of a dose in the 0.5-1 g range, it was found that none excreted the dose quantitatively as saccharin within 72 h. Alkaline hydrolysis of the urine samples, using conditions known to convert saccharin quantitatively to o-SAMB, increased the overall recoveries to 91-99% of the dose. It was not definitely established what form of saccharin was present to account for the increased recovery on alkaline hydrolysis. Hydrolysis of saccharin to o-SAMB in vivo, followed by conjugation with glycine was one possibility, but it was also considered possible that part of the saccharin (an average of 7%) was merely loosely bound to a normal urinary constituent so that it failed to extract in the normal manner. SAMB was not detected as such in the urine samples of any of the subjects. AS

18

Dipeptide sweetening agent.
Squibb & Sons, Inc.
British Patent 1 325 368 (1973) [En]

Water-soluble dipeptide sweetening agents are described. IFT

19

Low calorie sweeteners.
Glicksman, M.; Wankier, B. N. (General Foods Corp.)
United States Patent 3 761 288 (1973) [En]

Readily soluble sweetening compositions are produced by co-drying solutions of an edible bulking agent and a dipeptide sweetening compound. IFT

20

Long-term toxicity of sodium cyclamate in mice.
Brantom, P. G.; Gaunt, I. F.
Food and Cosmetics Toxicology 11 (5) 735-746 (1973) [30 ref. En, fr, de] [British Ind. Biol. Res. Assoc., Woodmansterne Rd., Carshalton, Surrey, UK]

Dietary levels of 0.7, 1.75, 3.5 or 7.0% sodium cyclamate were fed to groups of 30 male and 30 female mice. There were slight reductions in the rate of body wt. gain during the last 6 months of the study in female mice given diets containing 0.7-3.5% cyclamate. No effects were noted in respect of mortality, organ wt. or incidence of histological changes. It was concluded that sodium cyclamate does not exert a carcinogenic effect in mice at dietary levels ≤7.0% and that the no-untoward-effect level in this study was 3.5%. VJG

21

Health laws and regulations - Thailand.
World Health Organization
International Digest of Health Legislation 23 (4) 859-861 (1972) [En] [Geneva, Switzerland]

A selection of health laws and regulations for Thailand is presented including the following which relate to food hygiene: Notification No. 20 of the Ministry of Public Health on prohibition of import or ordering of any kind of food containing cyclamic acid or its salts as sugar-substitute sweetening agent, and prohibition of its utilization in any kind of food; Notification No. 21 of the Ministry of Public Health re determination of controlled food, quality, standards, processes of production and conditions for labelling of oil used in cooking (dated 24 Dec., 1969). VJG

22

Health laws and regulations - Spain.
World Health Organization
International Digest of Health Legislation 23 (4) 785-799 (1972) [En] [Geneva, Switzerland]

A selection of Spanish health laws and regulations is presented including the following which relate to food hygiene: Resolution of 10 Dec., 1969; of the General Directorate of Health, lays down rules for the use of cyclamates as artificial sweeteners. Use of cyclamates in beverages, foodstuffs and dietetic products for general consumption is only permitted with a special licence from the General Directorate of Health. The package must bear the words 'contains cyclamate' with the cyclamate content expressed as a percentage. Decree No. 544 of 9 March, 1972, amends certain sections of the regulations for milk centres and other undertakings for the processing of milk. VJG

23

Health laws and regulations - Israel.
World Health Organization
International Digest of Health Legislation 23 (4) 776-781 (1972) [En] [Geneva, Switzerland]

A selection of Israeli health laws and regulations is presented including the following which relate to food hygiene: the Public Health (Cyclamates) Rules, 1970 (dated 21 July, 1970) declare it unlawful to manufacture, import, sell or in any manner transfer to another person a foodstuff containing cyclamate, (defined as cyclohexylsulphamic acid, calcium cyclohexylsulphamate or sodium cyclohexylsulphamate) but it is lawful to manufacture, import, sell and transfer cyclamate tablets provided certain requirements are fulfilled; the 1971 Amendment to the Public Health (Food Colorants) Rules 1963, adds Brilliant Blue FCF as synthetic colour Blue No. 3 to the list of approved synthetic colours; 1971 Amendment to the Public Health (Preservatives in Food) Regulations 1965, establishes a limit (500 ppm) for sodium nitrate in pickled, smoked, salted or preserved meat and fish products; 1971 Amendment to the Public Health (Emulsifiers and Stabilizers in Food) Regulations 1966, deletes brominated oils from the approved list; the Public Health Rules 1970 (dated 10 Oct., 1971) defines 'remnant of control agent' and considers tolerance of such residues. VJG

24

[Technological variations in the manufacture of sweetened fruit juices.]
Flaumenbaum, B. L.; Shengeliya, A. S.
Konservnaya i Ovoshchesushil'naya Promyshlennost' No. 5, 22-24 (1973) [Ru] [Odesskii Tekh. Inst. Pishchevoi Promyshlennosti imeni M. V. Lomonosova, USSR]

Sweetened fruit juices are made from a combination of natural juice, water and sugars by blending extracted juice with sugar syrup (method I), or by blending aqueous extract, obtained by diffusion during counterflow extraction of fruit pulp, with sugar (method II). The taste of sweetened fruit juice depends upon the sugar/juice acid ratio. Min. sugar content should be 18%, acidity 0.8-1.5% and the sugar/acid ratio 20-29. A number of equations and examples are presented to elucidate the blending techniques of methods I and II when producing sour cherry and cranberry juices. Data on sweetened sour cherry juice are presented for methods I and II (the latter in parentheses): refractometric DM (%) 18.9 (18.9); total sugars (%) 17.24 (17.6); invert sugar (%) 16.9 (17.0); fructose (%) 8.1 (8.4); (%) sucrose (%) 0.69 (0.54); (%) acid (converted to malic acid) (%) 1.46 (1.43); pectins (%) 0.5 (0.34); pH 3.25 (3.32); relative density 1.07 (1.07); viscosity 1.33 (1.33); sediment (vol. %) 1.9 (1.0); ethanol (%) 0,28 (0.32); aroma number (ml 0.2N sodium thiosulphate/100 ml juice) 0.94 (0.8). STI

25

[Method of producing inverted sugars.] Verfahren zur Herstellung von invertierten Zuckern.
Kuhnert, P.; Lütz-Binder, D. (Joh. A. Benckiser GmbH Chemische Fabrik)
German Federal Republic Patent Application 2 139 752 (1973) [De]

Invert sugar is produced by adding to a sugar solution 0.01-0.50% (based on solids content, or 0.01-0.10% in the case of hot solutions) of gluconic acid, and subsequently cooling and obtaining a solid final product as required. The long reaction time provided by the gluconic acid allows partial inversion to be carried out to the desired degree, and does not result in discoloration at high temp.; also, subsequent neutralization and removal of precipitated salts are unnecessary, and gluconic acid does not corrode storage tanks. In a continuous process involving a shorter reaction time, quantities of gluconic acid are increased to 0.50% in which case, if the sugar is to be preserved for a long time, pH is afterwards raised to 4. End products may be invert sugar in the form of crystals or syrup, synthetic honey and similar products. W&Co

26

Levulose and invert sugars. [Review]
Moroz, R. D.; Sullivan, J. P.; Troy, J. P.; Broeg, C. B.
Sugar y Azucar **68** (8) 46-52 (1973) [54 ref. En]

This review considers the following aspects: physical and chemical properties of invert sugar and laevulose (measurement of concn., solubility, viscosity, fp depression, hygroscopicity, sweetness); manufacture of laevulose (extraction, hydrolysis, laevulose lime precipitate, filtration, purification, crystallization); manufacture of invert sugar; application of invert sugar and laevulose in the food industry; invert sugar and the baking technologist; invert sugar and the confectionery technologist; and characteristics and uses of laevulose. Tables give the following additional information: liquid sugar and invert sugar distribution (1967-1972); liquid sugar usage by type of industrial buyer (1967-1972); and US imports of laevulose from Austria, Belgium, Finland, France and Japan (1967-1971). VJG

27

Process for the production of sweetened foods and drinks.
Hagashibara Ken
Molochnaya Promyshlennost' 1 336 002 (1973) [En]

Sweetening agents of high sweetening power and low crystallization characteristics, consisting of oligosaccharides containing fructose at their molecular ends, are obtained by subjecting a mixture of a starch hydrolysate and sucrose, fructose or sugar mixtures containing sucrose and/or fructose to the action of e.g. Bacillus macerans amylase or fungal α-amylases. Examples of the application of these sweetening agents in the manufacture of frozen dairy desserts and ice creams, sweetened condensed milk, sweetened dried milk, coffee milk etc. are given. FL

28

The use of lactase to sweeten yogurt without increasing calories.
Engel, W. G.
Cultured Dairy Products Journal **8** (3) 6-7 (1973) [En] [Enzyme Development Corp., New York, USA]

Skim-milk fortified with 4% dried skim-milk was heated, cooled to 90°F and MAXILACT® (a brand of lactase) was added to portions of it at 25, 50 or 100 mg/qt. The extent of hydrolysis (to galactose and glucose) was determined at intervals and yoghurt culturing was started. It is suggested on the basis of limited tests that plain yoghurt in which 50% of the lactose was hydrolysed before culturing should probably be acceptable to both the people who do not like yoghurt because of its sour-milk characteristics as well as to those who enjoy ordinary plain yoghurt. In peach yoghurt a 85% hydrolysis gave product of reduced sugar content and yet of sufficient sweetness. FL

29

Corn sweeteners for ice cream: an update review.
Leeder, J. G.
Dairy and Ice Cream Field **156** (11) 42, 44, 46 (1973) [En] [Dept. of Food Sci., Rutgers, St. Univ. of New Jersey, New Brunswick, USA]

30

Saccharin: distribution and excretion of a limited dose in the rat.
Matthews, H. B.; Fields, M.; Fishbein, L.
Journal of Agricultural and Food Chemistry **21** (5) 916-919 (1973) [10 ref. En] [Analytical and Synthetic Chem. Section, Nat. Inst. of Environmental Health Sci., Research Triangle Park, N. Carolina 27709, USA]

Administration of saccharin-^{14}C to male rats was designed to simulate the dose and conditions which might be used by humans. The dose (1 mg/kg) which represented 20% of the recommended "safe" dose was found to be rapidly absorbed from the gastrointestinal tract, distributed throughout the body, and excreted primarily in the urine. Blood and tissue levels reached peak concn. within 15 min after saccharin administration and decreased thereafter. The magnitude of the peak concn. was dependent upon whether the animals had been fed or starved prior to saccharin administration. Saccharin was rapidly cleared from most tissues; however, administration of multiple doses within a single day or over a period of several days resulted in accumulations of saccharin in some tissues,

particularly the bladder. Removal of saccharin from the diet resulted in almost complete tissue clarance within 3 days. AS

31

[Application of glucose syrup instead of crystal glucose in riboflavin manufacture.]
Grigorev, V. S.; Chuvasheva, K. K.; Shchegolev, V. V.; Pankratov, A. Ya.
Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya No. 2, 63-64 (1973) [3 ref. Ru] [Voronezhskii Tekh. Inst., USSR]

Products with high sugar content may be obtained directly from starchy raw material using enzymes and eliminating the phase of starch isolation and purification. Surface culture of the mould Rhizopus delemar B was used to provide the source of glucoso-amylase in cornflour hydrolysis. The depth of starch hydrolysis reached 98.45% of reducing compounds at 96.87% of glucose. The effect of various concn. of glucose syrup in the fermentation mixture on the synthesis of riboflavin using Eremothecium ashbyi as enzyme producer was studied. The most intensive riboflavin synthesis occurred when 1.0 to 2.0% of reducing compounds were present in the growth medium (704-820 μg B_2 in 1 ml). STI

32

Ingredients and formulations for aseptic processing.
Petricca, A. V.
AIChE Symposium Series **69** (132) 103-106 (1973) [En] [Glidden-Durkee, Strongsville, Ohio 44136, USA]

Some functional properties of food ingredients and how they are adapted for use in aseptically processed foods are discussed under the headings: lipid systems in aseptic products; emulsifiers in aseptic products; starches and stabilizers in aseptic products; stabilizing systems for aseptic products; sweeteners in aseptic products; and protein systems in aseptic products. Product formulations are presented for aseptic puddings, aseptic ready-to-whip icings, imitation sour cream and chip dips, aseptic cheesecake filling, and aseptic ready-to-use cheese fondues. AA

33

Starch as a source of sweeteners. The actual situation in the United States of America.
Whistler, R. L.
Stärke **25** (12) 424-426 (1973) [En, de, fr] [Dept. of Biochem., Purdue Univ., Lafayette, Indiana 47907, USA]

New developments in the commercial transformation of starch to sugar by low cost enzymatic reactions are discussed. An economic process has been developed to hydrolyse starch slurry to D-glucose with glucoamylase, followed by conversion of glucose to a mixture of approx. equal parts of glucose and fructose with isomerase. A 50:50 mixture is 1.2 times as sweet as sucrose. Apart from isomerase-converted corn syrups, other sugars derived from starch such as corn syrups and sugars, crystalline dextrose, maltose, maltotriose and maltitol are important sweeteners. Maltose is a good food for yeasts, maltitol can be used in products requiring a non-reducing sweetener, both maltose and maltitol are more stable than sucrose in acid foods. Corn and sorghum can be grown in sugar cane locations to produce a crop every 6 months (vs. 18 months for sugar cane), while producing at least as much sugar as cane besides other nutrients. RM

34

Colorimetric determination of saccharin in foods.
Fernandez-Flores, E.; Johnson, A. R.; Leber, B.; Larry, D.; Lerner, S.
Journal of the Association of Official Analytical Chemists **56** (6) 1411-1414 (1973) [10 ref. En] [Div. of Food Tech., Food & Drug Administration, Washington DC, 20204, USA]

Samples of 6 types of foods containing saccharin were subjected to a cleanup procedure, using lead acetate or alcohol precipitation. Saccharin was extracted with a combination of solvents and the extracts were treated with phenol and H_2SO_4 and heated to form coloured phenolsulphonphthalein derivatives. The colur was measured spectrophotometrically at 558 nm. The method was applied to soft drinks, fruit juices, food sweetener tablets, concentrated liquid sweeteners, jellies, preserves, low calorie high protein powders, granulates, and liquids and chocolate bars. Recoveries ranged from about 90.3 to 121.0% in spiked samples. Satisfactory recovery was obtained for levels as low as 5 mg/100 g sample (0.005%). AS

35

[New natural sweetening agents.] Neue Süssstoffe aus der Natur.
Deininger, R.
Brauwelt **113** (81) 1747-1749 (1973) [De] [Süssstoff-Verband e.V., Cologne, Federal Republic of Germany]

The origin, structure, toxicity and relative sweetness of stevioside, dihydrochalcones, aspartyl phenylalanine methyl ester, thaumatin, monellin and miraculin are discussed. TUB-IGB

36

[Syntheses of biologically active isocoumarins. I. Chemical structure and sweet taste of 3,4-dihydroisocoumarins.]
Yamato, M.; Kitamura, T.; Hashigaki, K.; Kuwano, Y.; Yoshida, N.; Koyama, T.
Journal of the Pharmaceutical Society of Japan [Yakugaku Zasshi] **92** (4) 367-370 (1972) [6 ref. Ja, en] [Daiichi Coll. of Pharmaceutical Sci., Takamiya, Tamagawa-cho, Fukuokashi]

Studies were undertaken to elucidate the relationship between sweetness and chemical structure of 3,4-dihydroisocoumarins because of the interest in phyllodulcin, the only sweet-tasting, 3,4-dihydroisocoumarin. A 3,4-dihydroisocoumarin derivative, in which either 3'-hydroxy or 4'-methoxy groups were bonded to the phenyl group in the 3-position of phyllodulcin had no sweetness. The presence of these hydroxyl and methoxyl groups in adjacent positions is necessary for sweetness. Sweet taste is not found if the positions of these 2 groups are reversed. It was found by syntheses of various derivatives that the lactone group and a hydroxyl group in the 8-position do not take part in the appearance of a sweet taste. AS

37

[Syntheses of biologically active isocoumarins. II. Chemical structure and sweet taste of 3,4-dihydroisocoumarins.]
Yamato, M.; Hashigaki, K.; Kuwano, Y.; Koyama, T.
Journal of the Pharmaceutical Society of Japan [Yakugaka Zasshi] **92** (5) 535-538 (1972) [7 ref. Ja, en]

3-(3-hydroxy-4-methoxyphenyl-3,4-dihydroisocoumarin and β-(3-hydroxy-4-methoxyphenyl)ethylbenzene were synthesized and were found to have a sweet taste. [See preceding abstr.] AS

38

[Syntheses of biologically active isocoumarins. III. Chemical structure and sweet taste of 3,4-dihydroisocoumarins.]
Yamato, M.; Kitamura, T.; Hashigaki, K.; Kuwano, Y.; Murakami, S.; Koyama, T.
Journal of the Pharmaceutical Society of Japan [Yakugaka Zasshi] **92** (7) 850-853 (1972) [6 ref. Ja, en]

The following modifications of (i) β-(3-hydroxy-4-methoxyphenyl)ethylbenzene (having the essential sweet part of the phyllodulcin molecule) were synthesized: (ii) β-(3-methoxy-4-hydroxyphenyl)ethylbenzene, (iii) 3-hydroxy-4-methoxyphenylmethylbenzene, (iv) 3-(3-hydroxy-4-methoxyphenyl)phthalide, (v) γ-(3-hydroxy-4-methoxyphenyl)propylbenzene, (vi) δ-(3-hydroxy-4-methoxyphenyl)butylbenzene and (vii) β-(3-hydroxy-4-methoxyphenyl)cyclohexylethane. (ii), (iii), (iv) and (vi) were tasteless, while (v) and (vii) had a moderately sweet taste. Conswquently, it seems that not moderately sweet taste. Consequently, it seems that not only the position of the hydroxyl and methoxyl groups but also the distance between the 2 phenyl groups in these molecules may be important factors for the appearance of a sweet taste. [See preceding abstr.] AS

39

[Diterpenoids. XXII. Hydrofluorene compound with strong sweetness.]
Tahara, A.; Nakata, T.; Nakatani, H.; Kagiwada, K.
Journal of the Pharmaceutical Society of Japan [Yakugaka Zasshi] **93** (8) 951-956 (1973) [7 ref. Ja, en] [Rikagaku Kenkyusho, Inst. of Physical and Chem. Res., Wako, Saitama]

Of 4 stereoisomers (IXa, Xa, XIa, XIIa) of a hydrofluorene derivative recently derived from pine rosin [see FSTA (1972) **4** 3T132], only IXa has a strong sweetness (about 1000 times sweeter than sucrose and about 12 times more bitter than caffeine); the others have no taste. Stability and acute toxicity of IXa were examined. AS

40

[Diterpenoids. XXIII. Relation between structure and sweetness of hydrofluorene derivatives, and improved method for synthesizing a new sweetener.]
Tahara, A.; Nakata, T.; Ohtsuka, Y.; Takada, S.; Tanabe, T.
Journal of the Pharmaceutical Society of Japan [Yakugaka Zasshi] **93** (8) 957-963 (1973) [14 ref. Ja, en]

A new type of sweetener having a hydrofluorene structure was recently isolated [see preceding abstr.]. Correlations between its sweetness and structure were studied. An improved method for its synthesis was developed. AS

41

Saccharin sweeteners.
Bliznak, J. B. (Alberto-Culver Co.)
United States Patent 3 773 526 (1973) [En]

Bitter after-taste of saccharin sweeteners is reduced by the addition of $CaCl_2$ in admixture with a major proportion of a starch hydrolysate. IFT

42

Sweetening compositions.
Procter & Gamble Co.
British Patent 1 334 447 (1973) [En]

Sweetening compositions based upon dehydrochalcones are described. IFT

43

Sweeteners - from corn!
Hill, F. R.
Sugar y Azucar **68** (10) 18-20, 44, 46-47 (1973) [En, Es]

A flow chart of a typical corn wet milling process is presented. Of the starch produced by this process, 60% is converted to corn sweeteners by either the acid or enzyme process, descriptions of which are given. 3 types of commercial corn syrups and sugars are produced: corn syrups, corn syrup

solids and dextrose. Mention is made of several new types of corn sweeteners: acid-enzyme converted syrups, high in maltose, and 'extra' high acid-enzyme converted syrup in the ranges above 68 D.E. and isomerized sweeteners with the sweetness of medium invert. VJG

44

Alternative sweeteners.
Dewdney, P. A.
Literature Survey, British Food Manufacturing Industries Research Association No. 11, 10pp. (1973) [24 ref. En, fr, de] Price £1.00 [British Food Manufacturing Ind. Res. Assoc., Randalls Road, Leatherhead, Surrey, UK]

The properties and characteristics of sweet-tasting proteins (monellin and thaumatin I and II), taste-modifying protein (miraculin) and a sweet-tasting synthetic dipeptide (aspartame) are described. The properties, toxicity and commercial possibilities of neohesperetin dihydrochalcone, naringin dihydrochalcone and hesperetin dihydrochalcone glucoside are also considered. VJG

45

[New official regulations.] Neue Rechtsbestimmungen.
Haupt, H. G.
Industrielle Obst- und Gemüseverwertung **58** (20) 589-596 (1973) [De]

New Federal German regulations concerning addition of formic acid to foods (prohibited after 31 Dec., 1973); prohibition of dulcin (from 13 May, 1973); addition of SO_2 to grape juice (declaration of quantities >20 mg/kg); and presence of pesticide residues in foods are discussed. A list of max. permitted contents of 185 pesticides in named agricultural products and a list of 24 pesticides with no tolerance are appended. SKK

46

[Food allergy.] Lebensmittelallergie. [Review]
Askar, A.; Bielig, H. J.
Alimenta **13** (1) 3-4, 6-9 (1974) [69 ref. De, en, fr] [Inst. für Lebensmitteltech., Frucht- und Gemüsetech., Tech. Univ., Königin-Luise-Str. 22, D-1000 Berlin 33 (West)]

This literature review of current information about food allergies includes brief notes on the chief sources of allergens among vegetable and animal foods and food additives (preservatives, antioxidants, dyes, pesticide residues, sweeteners), and discusses their thermostability. RM

47

Relation of selected properties of liquid foods to acceptability.
Powers, J. J., Supran, M. K.
Chemical Senses and Flavor **1** (1) 103-113 (1974) [31 ref. En] [Dept. of Food Sci., Univ. of Georgia, Athens, 30602, USA]

Liquid beverages [milk and vanilla- and chocolate-flavoured beverages] were evaluated by a food-intake method to relate the composition of the beverage to volume and calories consumed, rates of consumption and hunger-satiety ratings of the panelists before and after consumption. In two of the series, hedonic evaluations were conducted in parallel. Total consumption, rates of consumption, preference, and hunger-satiety ratings were significantly different in some of the trials according to the composition of the beverages, osmolarity, viscosity, and sweetness. AS

48

Soft drink manufacture. [Book]
Gillies, M. T.
Food Technology Review, Noyes Data Corporation No. 8, x+336pp. ISBN 0 8155 0507 8 (1973) [En] Park Ridge, New Jersey, USA, Noyes Data Corp. Price $36.00

The information in this book is based on US patents since 1960, which relate to the manufacture of soft drinks. The Table of contents is organized in such a way as to serve as a subject index. The following chapters are included: Apparatus for producing carbonated beverages (pp. 2-51); Carbonated beverages (pp. 52-94); Acidulants for citrus drinks (pp. 95-137); Additives for citrus drinks (including sweetening agents, colouring agents, clouding agents, pulping agents, flavouring compositions, flavour enhancers, clarifiers, stabilizers) (pp. 138-213); Citrus drink production (pp. 214-233); 'Slush drinks' (carbonated and non-carbonated) (pp. 234-272); Miscellaneous beverages (fruit flavoured, fruit and milk drinks, citrus drink containing liquorice, beverages containing soybeans, maple sap drinks) (pp. 273-307); and Miscellaneous packaging (pp. 308-331). Company, inventor and patent number indexes are provided. VJG

49

Structural functions of taste in the sugar series: cyclohexane polyols as sweet analogues of the sugars.
Birch, G. G.; Lindley, M. G.
Journal of Food Science **38** (7) 1179-1181 (1973) [15 ref. En] [Nat. Coll. of Food Tech., Weybridge, Surrey, UK]

This paper reports the sensory properties of some cyclohexane polyols containing from 1 to 6 hydroxyl substituents in relation to their configuration, conformation and analogy with the sugars. It is concluded that changes in configuration in polyhydroxyl cyclohexanes cause alteration in their sweetness values from those of the sweetest known sugars down to nothing. These changes cannot be explained simply on the basis of H

ponding and imply changes in binding mode due to alterations in the lipophilic character of the molecules. [See also FSTA (1973) 5 11L798.] IFT

50

Starch syrups.
Hayashibara, K.
British Patent 1 335 535 (1973) [En]

Liquefied starch solutions are combined with sugar mixtures containing sucrose and/or fructose as acceptors. The compositions are then treated with an amylase from Bacillus macerans to yield high quality sweeteners containing oligoglycosyl fructose. IFT

51

[Method for the production of carbohydrates.]
Verfahren zur Herstellung von Kohlenhydraten.
F. Hoffmann-La Roche & Co. AG
Swiss Patent 541 531 (1973) [De]

Xylose suitable for the manufacture of xylite (sweetener) is produced from xylane- and cellulose-containing materials containing carbohydrates and lignin by acid hydrolysis of the starting material for precipitation of the lignins; separation of the lignins from the aqueous hydrolysate; passage of the aqueous hydrolysate through an ion exchanger; concn. of the resultant eluate to a water content of 5-15% by wt.; and precipitation of the crystalline xylose from the concentrate by addition of methanol, and isolation of the xylose. The preferred starting materials are aqueous, hemicellulose extracts, e.g. wood extracts obtained as waste products in the cellulose industry. The xylose obtained by this process has a degree of purity high enough to permit hydrogenation to xylite without further purification, as there is no danger of hydrogenation coming to a stop because of catalyst contamination. W&Co

52

[Determination of cyclamates in some cyclamate-containing products.]
Czuczy, P.; Pinter, I.
Elelmiszervizsgalati Közlemenyek **19** (3) 97-101 (1973) [13 ref. Hu, ru, de, en, fr] [Orsz. Elelmezes- es Taplalkozastud. Intezet, Budapest, Hungary]

The Wilson method [J. Ass. off. Agric. Chem. (1955) **38**, 559 and (1960) **43**, 583] was found to be suitable for the determination of cyclamates in sweetening pills even in the presence of saccharin. For fruit syrups, a previous clarification with Carrez solutions is necessary to obtain cyclamate recoveries of approx. 95%. In chocolates, a previous defatting followed by extraction with hot water and clarification is necessary. Recoveries were then approx. 90% when 0.1-0.2% of cyclamate had been added to the product. IF

53

[Participation of bacteria in the metabolism of sodium cyclamate in guinea pig.]
Asahina, M.
Journal of the Food Hygienic Society of Japan [Shokuhin Eiseigaku Zasshi] **13** (2) 133-136 (1972) [6 ref. Ja, en] [Nat. Inst. of Hygienic Sci., Kamiyoga, 1-chome, Setagaya-ku, Tokyo]

The intestinal bacteria were able to metabolize sodium cyclamate to cyclohexylamine even in the presence of a large amount of other nutrients or caecal contents of guinea pigs. When bacteria were orally administered to guinea pigs together with 1% sodium cyclamate solution as drinking water, cyclohexylamine was excreted in the urine earlier than in the control. Absorption of cyclohexylamine through the membrane of the intestine and excretion in the urine were demonstrated in another experiment by direct injection of cyclohexylamine into the caecum of guinea pigs. These observations support the actual participation of intestinal bacteria in the metabolism of sodium cyclamate. TM

54

Sweeteners.
Scott, D. (G. D. Searle & Co.)
United States Patent 3 780 189 (1973) [En]

Novel compositions contain a sweet dipeptide in addition to known sweetening agents. They possess enhanced sweetening potency. IFT

55

Artificial sweeteners.
Acton, E. M.; Leaffer, M. A.; Stone, H. (**United States of America**, Sanford Research Institute)
United States Patent 3 780 194 (1973) [En]

Artificial sweeteners comprise the oximes 1-cyclopentene-1-carboxyaldehyde syn-oxime, 1-cyclohexene-1-carboxyaldehyde syn-oxime, and tiglaldehyde syn-oxime. IFT

56

Artificial sweeteners.
Kracauer, P. (American Sweetener Corp.)
United States Patent 3 780 190 (1973) [En]

Soluble saccharin sweeteners contain a major amount of a soluble citrate as an extender and debittering agent. IFT

57

[Low-calorie sweetening agent.] Kalorienarmes Süssungsmittel.
Schiweck, H.; Steinle, G.; Haberl, L. (Suddeutsche Zucker-AG)
German Federal Republic Patent Application 2 264 304 (1973) [De]

Isomaltitol is used as sweetener, either alone or

mixed with other dietetic sugars, e.g. fructose or sorbitol, or as a carrier for artificial sweeteners, e.g. saccharin or cyclamates. The proportion can be 1:1 for the dietetic sugars, 0.14:99.86 in the case of saccharin, and 2.0:98.0 in the case of a cyclamate. The product can be used in the manufacture of chocolate, soft drinks, ice cream, cakes, jams and baby foods. W&Co

58

Compositions of matter containing heliotropyle nitrile as a flavoring and sweetening agent.
Neely, J. S. (Procter & Gamble Co.)
United States Patent 3 778 517 (1973) [En]

Compositions containing 0.0001-20.0 wt.% heliotropyl nitrile as a flavouring agent and sweetener are described. A wide range of foods and beverages is quoted as examples. IFT

59

At Holland dairies: quality frozen desserts with dextrose.
Anon.
Dairy and Ice Cream Field **157** (1) 38-39 (1974) [En]

Frozen desserts made at Holland Dairies, Indiana, include 25 flavours of ice cream, sherbets, custards and novelties. The sucrose has been replaced with a preblended liquid sweetener consisting of 85% sucrose and 15% dextrose in all formulae, resulting in appreciable improvement of the economy of manufacture whilst having no adverse effects on freezing points; sweetness, flavour and texture are excellent. FL

60

[Glucose syrup, glucose and fructose as alternative sweetening agents in ice cream.]
Steinsholt, K.
Meieriposten **63** (7) 136-141; (8) 169-176; (9) 195-198; (10) 228-231 (1974) [No]

In a factorial experiment with 64 ice cream mixes (produced from whole milk, butter and dried skim-milk, and containing 11% milk SNF, 10% milk fat and 0.6% stabilizer and emulsifier), ≤30% (or in a 2nd experiment ≤75%) of the sucrose content of 13% was replaced by dextrose, fructose or a glucose syrup containing 5% dextrose, 8% maltose, 11% trisaccharides, 8% tetrasaccharides and 68% higher saccharides. Sucrose was added to give a total sweetness corresponding to 13% sucrose. After pasteurization, homogenization and freezing in a Carpigiani soft-ice freezer, the samples were stored for 1 month at -21°C and then assessed organoleptically and analysed for viscosity, hardness, TS, density, meltdown, optical density etc. General conclusions were that replacement of 30% of the sucrose with the glucose syrup (or with dextrose, in the case of products consumed direct from the cabinet at low temp.) had a beneficial effect on ice cream quality, but replacement with fructose had apparently a negative effect. ADL

61

Polypeptide sweetener.
Tate & Lyle Ltd.
British Patent 1 337 086 (1973) [En]

A polypeptide sweetening material is obtained by enzymic degradation of the mucilaginous portion of Dioscoreophyllum cumminsii berries. IFT

62

Sweetening agents.
G. D. Searle & Co.
British Patent 1 339 101 (1973) [En]

Sweetening agents comprise esters of α-L-aspartyl-L-phenylalanine. IFT

63

Biochemistry of sensory functions.
Anon.
Hoppe-Seyler's Zeitschrift für Physiologische Chemie **355** (2) 99-113 (1974) [many ref. En]

Abstracts of papers presented at a Colloquium on 'Biochemistry of sensory functions', held at Mosbach, on 25 to 27 April 1973, include the following: Thaumatin and monellin, the intensely sweet-tasting proteins from tropical African fruits, by H. van der Wel (pp. 107-108, 4 ref.). VJG

64

[Studies on metabolism of sodium cyclohexylsulphamate. I. Urinary excretion of cyclohexylamine in monkey and effect of administration of faeces of cyclohexylamine-excreting monkey and commercial diet to rabbit, guinea pig and rat.]
Hayashi, N.; Iwahara, S.; Tanimura, A.; Furuya, T.; Kawamata, K.; Kaneko, T.
Bulletin of the National Institute of Hygienic Sciences [Eisei Shikenjo Hokoku] **91**, 11-18 (1973) [12 ref. Ja, en]

65

[Are substances injurious to health formed during food sterilization?]
Gutulescu, I. A.
Industria Alimentara **24** (10) 565-566 (1973) [8 ref. Ro]

This review-type article deals from the health viewpoint with changes brought about by heat treatment in major constituents of foods, vitamins and food additives such as colorants, aroma substances and sweetening agents. SKK

66

Sweeteners for baked foods.
Keal, E. J.
Bakers' Digest **47** (5) 80-82, 132 (1973) [En] [CPC International Inc., Englewood Cliffs, New Jersey, USA]

The subject is discussed under the headings: sweetener requirements for bread baking; chemistry of corn sweetener conversion; crystal formation and its prevention; discussion of individual sweeteners, i.e. dextrose sugar, 95-dextrose equivalent glucose syrup, corn syrups and corn syrup solids, sucrose/dextrose liquid blends, sucrose/corn syrup blends, levulose-bearing syrups, and hydrolysed cereal solids; sweetener applications in baked goods, e.g. bread and rolls, sweet goods, doughnut sugar, icings, cream fillings and pie fillings; and types of available sweeteners. AA

67

Sugar sweetness and pleasantness: evidence for different psychological laws.
Moskowitz, H. R.; Kluter, R. A.; Westerling, J.; Jacobs, H. L.
Science, USA **184** (4136) 583-585 (1974) [7 ref. En] [Pioneering Res. Lab., Natick, Massachusetts 01760, USA]

Sweetness and the pleasantness of sweetness of sucrose solutions and sweetened food conform to different functions. Sweetness rises with concn., whereas pleasantness first rises and then decreases. The breakpoint appears to occur at a constant sweetness (that is, constant sensory) level. AS

68

[Identification of some synthetic sweetening agents in wines.]
Rotolo, A.
Rivista di Viticoltura e di Enologia **25** (7) 301-310 (1972) [36 ref. It, en] [Istituto Sperimentale Agronomico, Bari, Italy]

A rapid method for the identification of 4 sweetening agents (saccharin, dulcin, cyclamates and P.4000 (1-oxypropyl-2-amino-4-nitrobenzene)) by TLC on silica gel H or Wattmann filter paper I is described. The properties of the main sweetening agents are briefly reviewed. AS

69

[Artificial sweetener.]
Towa Kasei Kogyo Co. Ltd.
Japanese Patent 4 904 950 (1974) [Ja]

A pasty sorbitol composition containing a large quantity of fine crystals is screw extruded to form extrudates which are cooled to <60°C and cut into pieces to form a granular artificial sweetener for diabetic use. IFT

70

Artificial sweeteners.
Walton, R. W. (E. R. Squibb & Sons Inc.)
United States Patent 3 795 746 (1974) [En]

A sweetening composition is prepared by intermixing an agglomerated sweetening agent with a liquid solution or suspension of an artificial sweetening agent, and drying the resultant mixture. IFT

71

[Glycyrrhizin taste improvement.]
Maruzen Kasei Co. Ltd.
Japanese Patent 4 907 227 (1974) [Ja]

Flavour-imparting properties of glycyrrhizic acid salts are enhanced by addition of sodium citrate. IFT

72

L-aspartyl-L-phenylalanine methyl ester (aspartame) as a sweetener.
Cloninger, M. R.; Baldwin, R. E.
Journal of Food Science **39** (2) 347-349 (1974) [12 ref. En] [Dept. of Food Sci. & Nutr., Univ. of Missouri, Columbia, 65201, USA]

In aqueous solutions, L-aspartyl-L-phenylalanine methyl ester (aspartame) was 182 times sweeter than 2% sucrose but only 43 times sweeter than 30% sucrose according to rank analyses of scores from 20 judges. In buffer solutions (pH 3.2), pH was elevated by 0.025% and 0.12% asparteme and not by 4% or 12% sucrose, but no effect on sweetness equivalents or sourness was detected. Sweetness of 0.025% aspartame was enhanced by gelatin (1.5%) and methocel (1%). Enhancement also occurred when gelatin was combined with 0.12% aspartame. Sweetness ranks were not significantly affected by 1% carboxymethylcellulose or gum arabic. Viscosity was not a reliable indicator of differences in sensory response for thickness. IFT

73

6-substituted-tryptophans, a new class of potent synthetic sweetening agents.
Kornfeld, E. C.; Suarez, T.; Edie, R.; Brannon, D. R.; Fukuda, D.; Sheneman, J.; Todd, G. C.; Secondino, M.
Abstracts of Papers, American Chemical Society **16**, MEDI 41 (1974) [En] [Lilly Res. Lab., Eli Lilly and Co., Indianapolis, Indiana 46206, USA]

DL-6-trifluoromethyltryptophan was accidentally discovered to be a very potent sweetening agent. A structure-activity study was conducted to explore this novel property. It was found that sweetness was restricted essentially to 5- and 6-substituted or 5,6-disubstituted tryptophans. Substitution on other positions on the indole ring or side chain were generally unprofitable. Of interest was the observation that sweetness was confined entirely to the "unnatural" D-isomer. Emphasis was given to

studies on 6-methyl and 6-chlorotryptophan. The latter (D-isomer), in a human taste panel, was 1300 times as sweet as sucrose. No aftertaste properties were observed. Preliminary toxicity studies on the DL-form in 4 species have shown no problems, and stability appears favourable. AS

74

[Recent findings relating to the taste of sweetness.] [Review]
Heraud, G.
Cahiers de Nutrition et de Dietetique 9 (1) 33-37 (1974) [8 ref. Fr]

75

Toxic hazards associated with processed foods.
Kingsford, M.
Food Technology in New Zealand 8 (4) 13-15, 18-19; (5) 20-22 (1973) [67 ref. En] [Dept. of Sci. & Ind. Res., Chem. Div., Petone]

Toxic hazards associated with raw materials, preparation, additives, processing, packaging, storage and transport in food processing are examined. Aspects covered include: Hg in the environment and in food; cyclamates; nitrates in spinach; Pb-alloy contamination; nitrate detinning by tomatoes; plastics food container contamination; and uncontrolled thawing. VJG

76

High fructose syrup cuts sweetener costs by 15%.
Anon.
Food Processing 35 (5) 38 (1974) [En]

Sweetener costs in the 15-flavour line of carbonated beverages produced by Popular Club Beverages, Baltimore, Maryland, have been reduced by 15% by the use of a special high-fructose corn syrup. Flavour and colour quality of the beverages were not affected and the shelf life of the finished beverages formulated with the syrup was found to be as good for the syrup/sugar beverages as for all-sugar sweetened beverages. AA

77

[Utilization of natural sweetening agents after prohibition of saccharin.]
Miyoshi, H.
Up-to-Date Food Processing [Shokuhin Kaihatsu] 8 (10) 26-33 (1973) [4 ref. Ja] [Prefectural Fermentation and Food Res. Sta., Shodoshima, Kagawa, Japan]

In Japan, dulcin, cyclamate, and saccharin were prohibited as food additives in 1969, 1969 and 1973, respectively. Natural sweetening agents include sugars, sugar alcohols, glycyrrhizin, and phyllodulcin. Topics discussed include problems in using natural sweeteners (e.g. physical effects, fermentability, browning, and price). It is emphasized that incorporation of less NaCl and more amino acids can enhance sweetness. SKa

78

[New natural sweeteners.] Neue Süss-Stoffe aus der Natur.
Deininger, R.
Gordian 74 (4) 146, 148 (1974) [De]

Some natural sweeteners are discussed including: stevioside, a glycoside obtained from the leaves of Stevia rebaudiana Bertoni; dihydrochalcones obtained by hydrogenation of citrus flavanone glycosides naringin, hesperidin and neohesperidin; aspartane, a dipeptide aspartyl-phenylalanyl methyl ester; thaumatin I and II, polypeptides obtained from the fruit of Thaumatococcus danielli Benth; monellin, a protein from the "**serendipity-fruit**" of Dioscoreophyllum cumminsii Diels; miraculin, a glycoprotein from the "**miracle-fruit**" **of Richardella** dulcifera. Although some of these substances are 2000-3000 times sweeter than sugar, they can not be used at present owing to insufficient toxicological examination. RM

79

Artificial sweetener.
Schlatter, J. M. (G. D. Searle & Co.)
United States Patent 3 800 046 (1974) [En]

Foods are artificially sweetened without unpleasant after-taste by incorporation of lower alkyl esters of aspartylhexahydrophenylalanine. IFT

80

[Chemical structure and sweet taste of isocoumarins and its derivatives. IV.]
Yamato, M.; Sato, K.; Hashigaki, K.; Ishikawa, T.; Koyama, T.
Journal of the Pharmaceutical Society of Japan [Yakugaku Zasshi] 93 612) 1639-1642 (1973) [Ja, en] [Fac. of Pharmaceutical Sci., Medical School, Univ. of Okayama]

Further investigation was made on the derivatives of β-(3-hydroxy-4-methoxyphenyl)-ethylbenzene, which is regarded as the essential structure for the sweet taste of phyllodulcin, and compounds (II-XIII) were synthesized. Both VIII and XI were sweet, whereas II, III, and IV were tasteless, and V, VI, VII, IX, X, and XII revealed a bitter taste. On the basis of these data, a relationship between the molecular structure and sweet taste receptor site was presumed. [See FSTA (1974) 6 4T193 for part III.] AS

81

Sweet taste - basic research with practical applications.
Morris, J. A.
Manufacturing Confectioner 52 (7) 38-39, 116 (1972) [11 ref. En] [Monell Chemical Senses Center, Univ. of Pennsylvania, Philadelphia, USA]

Sweet tasting substances considered include sucrose, saccharin, cyclamates, 1-aspartylphenylalanyl methyl ester, dihydrochalcones, miraculin and monellin. VJG

82

Food service science. [Book]
Smith, L. L. W.; Minor, L. J. (Editors)
viii+632pp. ISBN 0 87055 146 9 (1974) [4pp. of ref. En]

[Continued from preceding abstr.]
Carbohydrates, by L. L. W. Smith & L. J. Minor (pp. 409-428); Products from corn wet millings, by D. A. Bodner (pp. 429-445); Sweeteners, candies and gums, by L. L. W. Smith & L. J. Minor (pp. 446-464); Fat and oil technology, by H. W. Lawson (pp. 465-511); Paints, varnishes and lacquers, by L. L. W. Smith & L. J. Minor (pp. 512-527); Nutrition, by L. L. W. Smith & L. J. Minor (pp. 528-559); Food additives, essential tools of the food scientist, by M. A. Wolf (pp. 560-572) and Selected references and recommended journals (pp. 573-576). 4 appendices are included: Miscellaneous tables (pp. 577-611); Miscellaneous formulations (pp. 612-617); Free fatty acid tests (pp. 618-619); and Calculations used in food analysis (pp. 620-624). JA

83

Grain starch utilization study. [Book]
McNicol, D. G.; Knechtel, K. T.; Marshall, T.; Metcalfe, D. R.; Mills, A. S.; Wood, P.
155pp. (1972) [95 ref. En] Ottawa, Canada, Canadian Wheat Board [Dept. of Ind., Trade & Commerce, Ottawa, Canada]

This report of a committee appointed by the Minister responsible for the Canadian Wheat Board reviews and assesses the current capability of the Canadian industry to produce and market starch within the existing domestic and international environment, and identifies and recommends areas for specific action to improve this position. Sections in the report are: Introduction (p. 1); Terms of reference (pp. 2-3); The Canadian starch industry (pp. 4-43); which discusses background, products produced by the Canadian starch industry, Canadian market for starch and starch-derived products, and raw material usage; International situation (pp. 44-59), covering world production, sources of starch, world trade, and a review of specific countries; Starch chemistry & technology (pp. 60-89), covering starch, sweeteners from starch, other sweeteners, and Canadian research and development; Canadian government regulations (pp. 90-94); Outlook for starch industry (pp. 95-100), which discusses the demand in existing markets, potential new markets, and raw material requirements in 1978; and Possibilities for increasing the starch production of the principal Canadian field crops (pp. 101-116), such as cereal grains, potatoes, field peas, horse beans and Jerusalem artichokes. The report is concluded by a summary, conclusions and recommendations, a glossary, appendices, and a bibliography and list of persons contacted. JA

84

Consider ice cream mix formulations when varying the ingredients.
Cosgrove, C. J.
American Dairy Review 36 (5) 24B, 24D, 24F (1974) [En] [Dept. of Animal Sci., Univ. of Rhode Island, Kingston, USA]

Points to be considered when changing ice cream mix formulae are discussed with reference to reasons for the change, balancing the ingredients to avoid defects and comply with the standards, and use of sweeteners and dried whey (max. rate 25% in milk SNF in the finished product). FL

85

Isolation, identification, and quantitation of o-toluenesulfonamide, a major impurity in commercial saccharins.
Stavric, B.; Lacombe, R.; Watson, J. R.; Munro, I. C.
Journal of the Association of Official Analytical Chemists 57 (3) 678-681 (1974) [9 ref. En] [Food Res. Lab., Health Protection Branch, Health & Welfare Canada, Ottawa, K1A OL2]

o-Toluenesulphonamide (o-TS) was found to be a major impurity in 9 of 10 different saccharin samples used for carcinogenicity tests in animals in various laboratories. Isolation of o-TS from sodium saccharin was achieved by extraction with ethyl acetate, and separation was accomplished by using TLC. Saccharin samples obtained in the free acid form were first converted to their sodium salts. o-TS was identified by R_f and UV, IR and mass spectra. Quantitative detn. of o-TS was performed by GC. The concn. of o-TS in the samples ranged from 2.5 to 5050 ppm. AS

86

Effects of saccharin on rats fed chemically defined diets.
Purdom, M. E.; Hyder, K.; Pybas, M. D.
Journal of the American Dietetic Association 63 (6) 635-638 (1973) [12 ref. En] [School of Home Economics, N. Texas St. Univ., Denton, USA]

Feeding 0.05% saccharin (approx. 0.045 g/kg body wt.) to rats maintained on chemically defined

diets containing sucrose, corn oil, unsalted butter resulted in no extreme alterations in growth, protein synthesis, blood glucose or cholesterol levels solely attributable to the presence of saccharin. Results indicate that the use of saccharin in diets containing corn oil as the sole source of lipid produced an abnormal blood serum triglyceride level and lipoprotein profile. VJG

87

Table sirups; establishment of standards of identity.
United States of America, Food & Drug Administration
Federal Register 39 (116, Jun. 14) 20879-20882 (1974) [En] [Washington, DC]

Standards are promulgated under the Federal Food, Drug and Cosmetic Act for the following foods: table syrup, containing a min. of 65% soluble sweetener solids with or without specified additives; maple syrup containing a min. of 66% soluble solids from the sap of the maple tree (Acer) with or without salt, chemical preservatives, and defoaming agents; cane syrup containing a min. of 74% soluble solids from the juice of sugarcane, with or without salt, preservatives, and defoaming agents; and sorghum syrup containing a min. of 74% soluble solids from the juice of sorghum cane, with or without specified additives. CAS

88

Legislation on some additives in soft drinks.
Clarke, K. J.
Flavour Industry 5 (5/6) 120-121 (1974) [En]

Legislation applicable to 2 additives, caffeine and saccharin, commonly used in soft drinks in the UK and many other countries is considered. Legislative requirements are given for caffeine in 21 countries and for saccharin in 24 countries. VJG

89

Food Group Symposium.
United Kingdom, Society of Chemical Industry, Food Group
Journal of the Science of Food and Agriculture 25 (8) 1041-1054 (1974) [42 ref. En]

Interactions between sodium nitrite and foodstuffs [pork, egg, bread, milk, cheese] under gastric conditions, by B. E. Wells, R. Walker & C. L. Walters (pp. 1048-1049, 3 ref.); Long-term studies on some antioxidants in the rat, by D. N. Rudra, J. W. T. Dickerson & R. Walker (pp. 1049-1050, 4 ref.); Toxicity of BHT in life-span studies in rats, by T. J. B. Gray & D. V. Parke (pp. 1050-1051, 5 ref.); Implications of pH in the assay of total folate activity, by J. O. Malin (p. 1051, 5 ref.); The stereochemistry of sweetness, by M. G. Lindley & G. G. Birch (p. 1052); Factors affecting the acceptability of food - food colour, by J. Grant & J. Thomson (pp. 1052-1053); A technique for the trapping of flavour compounds eluted from gas chromatographic columns for organoleptic evaluation (sensory analysis), by R. G. Clark & D. A. Cronin (p. 1053, 1 ref.); and Changes in the microflora during the laboratory preparation of merissa, a beer-like African beverage, by A. P. Williams & M. O. Moss (p. 1054). JA

90

[A study of a new sweetener: maltitol.]
Lederer, J.; Delville, P.; Crevecoeur, E.
Sucrerie Belge 93 (7) 311-319 (1974) [10 ref. Fr, de, en, nl]

The metabolism of maltitol was studied in animal feeding experiments. It was given to rats either by gastric probe at a dosage of 2 g/kg or intravenously at 1 g/kg and to mice in 20% solution as sole source of drink. Glycaemia, insulinaemia and liver glycogen of rats and growth rate of mice were measured. Hyperglycaemia induced by maltitol was similar to that produced by an equivalent amount of sucrose or glucose but developed more slowly. No increase in blood insulin was observed. In vitro experiments showed that maltitol did not stimulate insulin secretion, did not inhibit glucose- induced secretion, was not attacked by α-amylose and only slightly by maltose. In mice, the liver glycogen content was reduced and growth of weanling animals was retarded. In microbiological studies, maltitol was strongly metabolised by Proteus vulgaris weakly by P. mirabilis and coliform bacteria. These studies indicate that maltitol is not suitable for use as a sugar substitute. RM

91

[Sweetening composition having dietetic properties.]
Bernet, G. E. M.
French Patent Application 2 183 611 (1973) [Fr]

A sugar substitute, which may be used in a similar manner and amount to ordinary sugar, comprises 83% lactose and 17% sucrose. W&Co

92

Symposium: sweeteners. [Book]
Inglett, G. E. (Editor)
ix+240pp. ISBN 0 87055 153 1 (1974) [many ref. En] Westport, Connecticut, USA; AVI publishing Co. Inc. Price $20.00 (US), $21.00 (Foreign) [Cereal Properties Lab., N. Regional Res. Lab., USDA, Peoria, Illinois, USA]

Papers presented at a Symposium on Sweeteners held at the American Chemical Society meeting in Dallas, Texas, on April 9-13, 1973, and sponsored by the Agricultural and Food Chemistry and Carbohydrate Divisions include: Sweeteners: new challenges and concepts, by G. E. Inglett (pp. 1-9, 47 ref.); Biophysics of sweetness, by L. M. Beidler (pp. 10-22, 31 ref.); Sensory perception of sweetness, by R. M. Pangborn (pp. 23-44, 86 ref.); Sweetener economics, by B. J. Walter (pp. 45-62, 18 ref.); Sucrose, by A. J. Vlitos (pp. 63-73, 53 ref.); Sucrose chemicals and their industrial uses, by P. K. Chang (pp. 74-77, 8 ref.); Corn sweetener industry, by J. D. Commerford (pp. 78-86, 4 ref.); High fructose corn syrup, by J. M. Newton & E. K. Wardrip (pp. 87-96, 21 ref.); Sweetness and sensory properties of dextrose-laevulose syrup, by G. A. Brooks, M. O. Warnecke & J. E. Long (pp. 97-110, 43 ref.); Maple syrup and honey, by J. W. White, Jr. & J. C. Underwood (pp. 111-130, 45 ref.); Synthetic sweeteners: past, present, and future, by K. M. Beck (pp. 131-140, 12 ref.).
VJG

93

Sweetening agents.
Lapidus, M.; McGettigan, M. M. (American Home Products Corp.)
United States Patent 3 814 747 (1974) [En]

N-trihaloacetyl aspartic acid dipeptide ester is used as a sweetening agent. IFT

94

Sweetening agents.
Scott, D. (Searle & Co. of Canada)
Canadian Patent 949 381 (1974) [En]

Conventional sweetening agents are combined with dipeptides to enhance their potency. IFT

95

Peptide sweetening agent.
Sheehan, J. T.; Ondetti, M. A. (Squibb & Sons, Inc.)
Canadian Patent 948 185 (1974) [En]

Dipeptide sweetening agent is used for sweetening foodstuffs. IFT

96

Food additives. Aspartame.
United States of America, Food & Drug Administration
Federal Register **39** (145, July 26) 27317-27320 (1974) [En] [Washington, DC, USA]

1-Methyl N-L-α-aspartyl-L-phenylalanine (i) containing 98-102% (i) after drying 4 h at 105° by lithium methoxide titration in N,N-dimethylformamide, specific rotation (dry basis) +12.5 - +17.5°, and ≤2% diketopiperazine by a gas chromatographic method (details given), may be used under the Federal Food, Drug and Cosmetic Act as a sweetener in dry foods: sugar substitute for table use, free-flowing or tablets; cold breakfast cereals; chewing gum; and dry bases for beverages, instant coffee and tea, gelatins, puddings, and fillings, and dairy product analogue toppings.
CAS

97

[Pathological changes in the skin of sensitive indivudals exposed to food additives and contaminants.]
Temime, P.
Revue Francaise de Dietetique **18** (69) 41-43, 45-46 (1974) [21 ref. Fr]

Food additives and contaminants (including sweeteners, acidulants, flavouring materials, colorants, preservatives, antibiotics, sulphonamides and pesticides) known to cause adverse skin reactions (allergy, photosensitization) in sensitive individuals are briefly discussed. AJDW

98

[Dietetic canned lemon products.]
Fishman, G. M.; Nizharadze, M. I.
Konservnaya i Ovoshchesushil'naya Promyshlennost' No. 1, 12-13 (1974) [Ru] [Batumskii Filial Gruzinskogo Nauchno-issled. Inst. Pishchevoi Promyshlennosti, USSR]

The canned low-calorie lemon and orange juices or fruit salads for diabetics are produced from natural juices and sorbitol or xylitol solutions used as artificial sweeteners. Thus a canned orange juice for diabetics containing 15% DM, 5.3% total sugars, 1.1% acids as (citric acid), 9.0% sorbitol, and 21.5 mg% vitamin C is made from 67% of natural juice

and 33% of 28% sorbitol solution. The analogous juice with xylitol is made from 67% of natural juice and 33% of 22% xylitol solution. The compositions of other analogous products are given. STI

99

[The sweet taste of sugar.] Der süsse Geschmack des Zuckers. [Lecture]
Kolber, A.
Zucker **27** (8) 415–417 (1974) [25 ref. De, en, fr] [Zentral Lab. der Süddeutschen Zucker AG, 6719 Obrigheim 5, Wormser Strasse 1, Federal Republic of Germany]

The literature on the chemical and physiological basis of sweetness is discussed. Sweetness arises structurally from the simultaneous action of 2 complementary H-bridges separated by 2.5-4 $\times 10^{-1}$ nm units, due in the case of sugars to 2 neighbouring -OH groups at an angle of 60° to the C atom. RM

100

[Some theoretical and practical problems of starch enzymology.] Über einige aktuelle theoretische und praktische Probleme der Stärkeenzymologie. [Lecture]
Hollo, J.
Stärke **26** (8) 257-263 (1974) [18 ref. De, en, fr] [Inst. für Landwirtschaftlich-chem. Tech., Tech. Univ., Budapest XI, Hungary]

Recent research on starch hydrolysates is discussed, including kinetics and bond breaking by the exoenzymes β-amylase and amyloglucosidase and the endoenzyme α-amylase. Examples are given of applications to industrial processes. Maltitol, a low calorie sugar replacer, is prepared by using bacterial isoamylase and wheat β-amylase. Using a 23% starch solution of 8% dextrose equivalent, simultaneous action of both enzymes for 40 h achieved 98% breakdown and production of 2.43% glucose; preliminary treatment for the first 18 h with β-amylase alone produced 96.5% breakdown with only 0.73% glucose, while similar treatment with isoamylase alone produced 99% breakdwon with 2.4% glucose. Invert sugar may be prepared from liquefied raw material of maize by simultaneous action of amyloglucosidase and glucose isomerase; the isomerisation of glucose to fructose permits 100% activity by the amyloglucosidase by preventing end-product inhibition. Immobilised enzymes, e.g. amyloglucosidase fixed on polyacrylamide gel, were also studied in model experiments on the kinetics of their action on 1-8% solutions of liquid starch, dextrin and maltose. RM

101

Continuous decolorisation with granular activated carbon.
Heroes, D. V.; Thorp, G. W.
Stärke **26** (8) 264-269 (1974) [3 ref. En, de, fr] [Chemviron S.A., B.P.17-Ixelles, 1050 Brussels, Belgium]

Pilot plant equipment for activated C treatment in continuous decolorisation of sweeteners is described and data are interpreted. The system consists of an adsorption and a carbon reactivation section. The laboratory isotherm allows approx. detn. of the adsorption capacity of the adsorbent, comparison of different carbons and operating conditions (temp., pH) and checks on the activity of the reactivated C. From interpretation of pilot tests in fixed beds in series or a single pulse bed column it was concluded that the pulse bed system is the more economical. RM

102

Artificial sweeteners.
Horowitz, R. M.; Gentili, B. **(United States of America**, Secretary of Agriculture)
United States Patent 3 826 856 (1974) [En]

Artificial sweetening compositions are based on dihydrochalcone xylosides. IFT

103

Sucrose-starch sweetener.
Okada, S.; Tsuyama, N.; Mitsuhashi, M.; Ogasawara, J. (Ken Hayashibara)
United States Patent 3 819 484 (1974) [En]

A sweetener having some of the properties of dextrin while being practically free of reducing sugars is prepared by subjecting sucrose and dextrin to cyclodextrin-glycosyl-transferase in an aqueous medium. IFT

104

Purification and some properties of miraculin, a glycoprotein from Synsepalum dulcificum which provokes sweetness and blocks sourness.
Giroux, E. L.; Henkin, R. I.
Journal of Agricultural and Food Chemistry **22** (4) 595-601 (1974) [38 ref. En] [Section on Neuroendocrinology, Hypertension-Endocrine Branch, Nat. Heart and Lung Inst., Bethesda, Maryland 20014, USA]

Miraculin, a taste-affecting glycoprotein from miracle fruit, Synsepalum dulcificum, has been purified by ion exchange column chromatography. Purified miraculin contains 6.3% carbohydrate and 14.4% N and has a mol. wt. of about 45 000. When denatured and reduced it is cleaved into 2 fragments, of approx. 28 000 and 17 000 mol. wt. The amino acid and carbohydrate compositions of miraculin have been investigated. 20 μg of chromatographically purified miraculin produces a marked increase in sweetness of lemon and concomitantly a marked diminution of sourness. AS

105

Flavor modification.

Harvey, R. J.; Fennell, J. R. (Mirlin Corp.)
United States Patent 3 824 323 (1974) [En]

A process is described for obtaining a dry powdered concentrate containing the taste modifying principle from Synsepalum dulcificum Daniell, in a stable form which can be used in foods, such as confectionery, desserts, jellies, jams, canned fruit, beverages, and coatings to render sour-tasting foods sweet, and to improve flavour. This taste modifying characteristic is retained for long periods under normal atmospheric conditions.
IFT

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